FAA | AVIATION NEWS

FEBRUARY 1966

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FAA | AVIATION NEWS

F E D E R A L A V I A T I O N A G E N C Y

VOL. 4, NO. 10 FEBRUARY 1966

COVER

Before his first solo flight, John Thatcher, 18, explains reasons for each step of the preflight check to Purdue instructor Joseph F. Vorbeck. (See "Sheepskin With Wings," pages 8, 9 and 10.)

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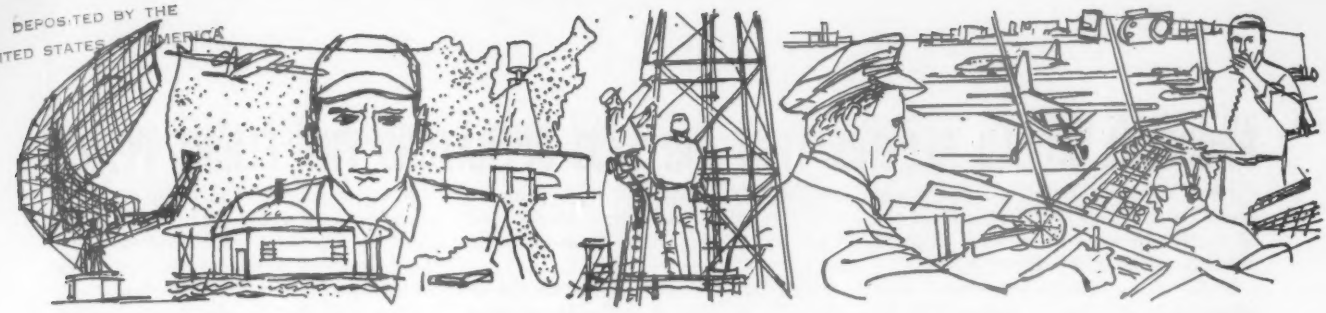


FIVE-YEAR PLAN RECOMMENDS 887 NEW LANDING FACILITIES

The new five-year National Airport Plan issued by the Federal Aviation Agency last month recommends construction of 887 new landing facilities and improvements to 3,219 others at an estimated cost of $1.28 billion.

Included in the new facilities proposed in the plan are 762 airports, 124 heliports and one seaplane base. The National Airport Plan is an annual FAA forecast of the airport needs of the nation over the ensuing five years.

Recommendations of the 1966-70 plan are based on a predicted rise in domestic air carrier revenue passengers from 82.5 million in fiscal 1965 to 107 million in 1970, and an expected rise in hours flown in general aviation from an estimated 16.3 million in 1965 to 19.5 million in 1970.

Improvement Estimate: $975 Million

Estimated cost of the proposed airport improvements over the five-year period is $975 million, with $302 million more estimated for the 887 new facilities. The National Airport Plan does not commit Federal funds, but blueprints the future needs of the nation for an adequate system of airports.

The plan is concerned primarily with the requirements of civil aviation but recognizes that in some instances military airports might serve civil aviation, thus avoiding unnecessary duplication of facilities.

Military Airports Considered

If there is a military airport in an area where the establishment of a new airport or extensive development to an existing airport is contemplated, the military airport must be declared undesirable for joint civilian use before a new project will be considered for inclusion in the plan.

GENERAL AVIATION FLYING TO 1975

(In Millions of Hours Flown)

FISCAL YEAR	TOTAL	BUSINESS	COMMERCIAL	INSTRUCTIONAL	PERSONAL
1960	13.0	5.7	2.4	1.9	3.0
1961	13.4	5.8	2.5	1.8	3.3
1962	14.0	5.7	2.8	2.1	3.4
1963	14.8	5.7	3.2	2.4	3.5
1964	15.5	5.9	3.4	2.6	3.6
1965*	16.3	6.1	3.6	2.8	3.8
1966*	17.0	6.3	3.8	2.8	4.1
1967*	17.7	6.5	4.0	2.8	4.4
1968*	18.3	6.7	4.1	2.9	4.6
1969*	18.9	6.9	4.3	2.9	4.8
1970*	19.5	7.1	4.4	3.0	5.0
1971*	23.0	8.1	5.0	3.9	6.0
1975*	23.0	8.1	5.0	3.9	6.0

*Forecast

The FAA is alert to the changing requirements of military aviation and the possible opening of new areas for civil use on a full or limited basis. Thus, the 1964 announcement by the Department of Defense of the discontinuance, reduction and consolidation of activities at some 95 facilities prompted immediate Agency action to determine possible use of these for general aviation. The plan discusses these possibilities.

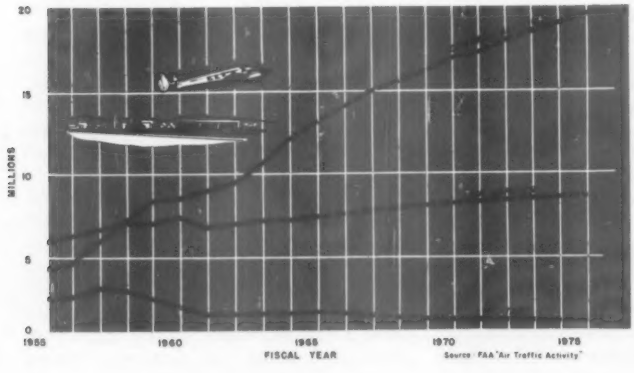
No Assurance of FAAP Aid

Whereas the location and development shown in the plan indicate eligibility under the Federal-Aid to Airports Program (FAAP), there is no assurance, even if a sponsor is available, that a specific location, or the magnitude of development described, will receive FAAP financial aid. Financial limitations or changing techniques in evaluating aviation needs could overtake and preclude carrying out the published recommendations.

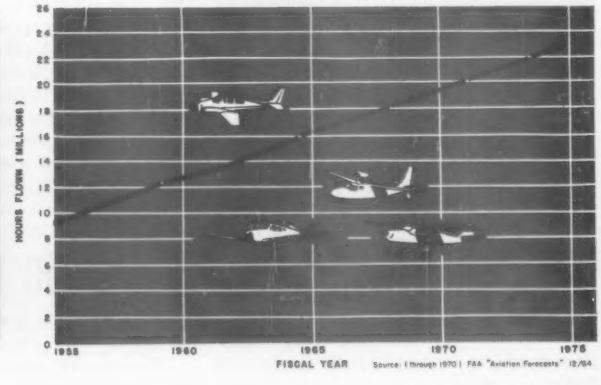
One of the most valuable sections of the 244-page book is the section devoted to airport data. This lists 4,106 airports, heliports and seaplane facilities, and gives vital statistics on each.

Copies of the National Airport Plan are available from the U.S. Government Printing Office, Washington, D. C. 20402, at a cost of $1.25.

ITINERANT AIRCRAFT OPERATIONS AT TOWER AIRPORTS TO 1975



GENERAL AVIATION FLYING TO 1975



PROPOSAL WOULD REQUIRE THAT AIR TAXI OPERATORS FILE FLIGHT PLANS

Pilots engaged in air taxi operations would be required to file flight plans for all flights regardless of weather, under a new rule proposed by the FAA.

Flight plan information would help speed up search and rescue activity in case of a crash, an emergency landing, or locating a lost pilot, particularly in mountainous or sparsely populated areas.

Present rules require that a flight plan be filed only for IFR conditions. No flight plan is required for operating in good weather, except in the case of pilots of large commercial aircraft or supplemental air carriers who must file a VFR flight plan in good weather. Such operators generally do not have the use of company two-way radio along their flight route as do the major airlines.

The proposal would make flight plans mandatory in good weather for operators of small commercial aircraft and air taxis, as is now required for the supplemental carriers and operators of large commercial planes. Private pilots on non-commercial flights would not be affected by the rule.

Under the proposal, the air taxi pilot would file either a VFR flight plan or an IFR plan, as he can do now, for flight in good weather. To file IFR, he would have to be IFR-rated and be equipped for IFR operation. Pilots on IFR flight plans receive air traffic separation service and other benefits not normally available to the VFR pilot.

Other than emergency purposes, the filing of VFR flight plans would facilitate maintaining contact between pilots and flight service facilities for exchange of information on flight conditions and other matters related to a flight. FAA encourages the filing of VFR flight plans and many pilots file them.

Flight plan information required would include pilot and aircraft identity, place and proposed time of departure, route, altitude, airspeed, amount of fuel and landing points. The pilot would be required, also, to "close out" his flight plan with the nearest communications station, thus giving assurance that the flight ended safely.

The proposed rule would make it compulsory also for air taxi operators to file an IFR flight plan when operating under instrument flight conditions outside of controlled airspace as well as when operating within controlled airspace as presently required. Present rules on air taxi operations permit such operations to take place without an IFR flight plan in uncontrolled airspace.

If communications facilities were not available to file either VFR or IFR flight plans for operation in uncontrolled airspace, the pilot would be required under the proposed rule to file his plan by radio as soon as practicable after he is airborne.

In the case of aircraft not required to have two-way radio for their particular type of operation and which are not so equipped, the flight plan requirement may be waived if communications facilities are not available for filing. The operator would be required to obtain an FAA amendment to his operations specifications authorizing an exemption to the flight plan requirement.

Other exceptions to the requirement for filing flight plans that would be considered under the proposal would be in the case of flights conducted entirely within the metropolitan area and flights for which the operator maintains an approved company flight following service.

Comments on the proposed regulation (Docket No. 7115; Notice 66-2) should be submitted in duplicate to the Federal Aviation Agency's Office of General Counsel; Attention: Rules Docket, 800 Independence Ave., S.W., Washington, D. C. 20553. Comments should be submitted not later than March 21, 1966.

MEDICAL EXAMINERS ATTEND SEMINAR IN KANSAS

Doctors demonstrate otolaryngology examination.

Among the hundreds of doctors from 17 states attending the FAA-sponsored medical seminar at the University of Kansas were these four who demonstrated an ear examination for pilots. From the left, Dr. J. W. Findley, Kansas City, Mo.; Dr. Herbert C. Winge, Wheaton, Minn., who portrayed the patient; Dr. Ernest Nalle, Jr., Lubbock, Texas, one of the speakers, and Dr. Monti L. Allen, University of Kansas School of Medicine.

Most of the 5,800 Aviation Medical Examiners in the United States are pilots or former flight surgeons, and the rest have shown a special interest in aviation by volunteering to serve as AMEs to conduct physical examinations for pilots.

The FAA provides AMEs with a "Guide for Aviation Medical Examiners" and requires that they attend FAA-sponsored clinics every three years. Almost half of the fatal accidents in general aviation are medically investigated by an AME.

Washington National Opens to Small Jets April 24

The FAA will open Washington National Airport to two- and three-engine short-haul jets on April 24, shortening the flight time between the Nation's Capital and certain major cities in the eastern half of the United States by a significant margin.

The airport, which was opened on June 16, 1941, has never previously accepted scheduled air carrier jets.

Forecast Sets General Aviation Aircraft at 123,400 by 1971

General aviation active aircraft will increase from 88,742 as of January 1965 to 123,400 by 1971, according to the FAA's latest five-year aviation forecast released last month. The forecast was prepared for use in planning FAA's five-year program.

Most of the increase will be in the large single-engine aircraft which will grow from 45,777 aircraft to an estimated 69,700. Multi-engine aircraft will increase from 10,644 in 1965 to 18,800 in 1971, and turbine-powered general aviation aircraft from 306 to 1,850. General aviation will log 22.8 million flight hours in fiscal year 1971 in contrast to the 16.2 million logged in 1965.

U. S. domestic and international scheduled air lines will carry nearly 160 million passengers by fiscal year 1971.

A limited number of free copies of FAA's *Aviation Forecasts, Fiscal Years 1966-1971*, are available to the public. Send a self-addressed mailing label with your request to the Federal Aviation Agency, HQ-438, 800 Independence Avenue, S.W., Washington, D. C. 20553.

McKee Sets City-Center Travel Record from Washington to New York City

10:24 a.m. FAA Administrator McKee lifts off from the FAA Headquarters Building in Washington, D. C. Touchdown time in downtown New York—11:27 a.m.

The city-center to city-center concept of flight received a boost recently from FAA Administrator William F. McKee. Upon arrival in New York, he described his trip from the Nation's Capital in these words:

"Just a little more than an hour ago, I was at my desk in my office in Washington. It was time to go. I climbed the one flight of stairs to our roof-top heliport, boarded a helicopter and zipped across the Potomac to Washington National Airport. I flew by jet to Kennedy where another chopper waited. Flying time from Kennedy to the new Pan Am Heliport—seven minutes. . . .

"It may be that I now hold the speed record from downtown Washington to downtown New York."

The FAA administrator was describing to the Wings Club in New York City his all-air trip from FAA Headquarters in Washington to the Biltmore Hotel in Manhattan. His pad-to-pad travel time was 63 minutes.

The all-air trip was made as part of the program of inaugurating helicopter service from the roof of the Pan American Building to John F. Kennedy International Airport.

The service from the 808-foot-high helipad formally began Dec. 21 and the operations schedule calls for 17 incoming and 18 outgoing flights a day. Fare for the seven minute trip is $7.

In his remarks, Administrator McKee congratulated Pan American and New York Airways for their initiative in setting up the new service.

Undeveloped Areas Home, Abroad Dependent on General Aviation: Reynolds

Undeveloped areas in the United States as well as abroad are dependent on general aviation air transportation, according to Robert V. Reynolds, FAA's assistant administrator for General Aviation Affairs.

In an article prepared for *Air Force Space Digest INTERNATIONAL*, published by the Air Force Association, Washington, D. C., Reynolds states:

"Many people refer to parts of the world as being undeveloped, thinking of some place far from home. In the United States, there are still areas that can be termed undeveloped which general aviation aircraft now serve and will serve even more effectively in the years to come.

"Areas in Maine, Texas, Montana, Idaho and Alaska, for example, regularly depend on general aviation air transportation for . . . business, agriculture, administrative and recreational uses.

"Many parts of the world are literally moving from the early stages of surface transportation directly into the air age. These nations are skipping the historically traditional water, rail and highway modes of transportation. In Australia there are plans under way for serving many parts of that great land with air transportation provided by general aviation type aircraft.

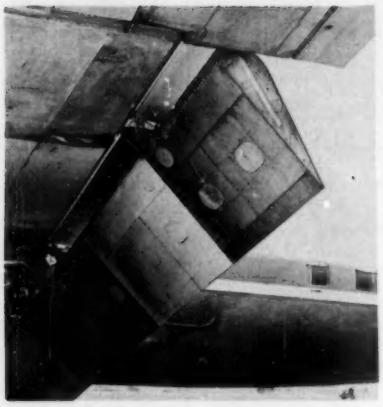
"The general aviation industry on a world-wide basis can be the limbs, the branches and the leaves of the air carrier trunk system which now serves the world. Those communities and those nations which develop airports that are suitable for general aviation aircraft will be on the shore of the world-wide ocean of air that knows no aerodynamic boundaries. In the United States we have developed general aviation to a fairly high degree of utility; performance with safety. Yet there are many of our communities that are unaware that general aviation is, indeed, a sleeping giant of economic development. Areas of the world that have made less progress in developing surface transportation have both a challenge and an opportunity to solve some of their transportation and communication problems by adapting general aviation aircraft to their needs.

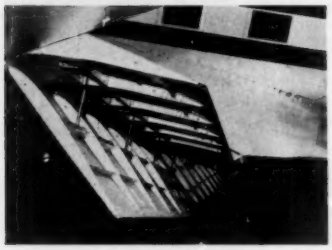
"General aviation pilots from foreign lands who fly in the U.S. are often surprised to find the freedom of access they have to airports in metropolitan areas that are used by air carrier aircraft, including intercontinental jets, business aircraft and aircraft flown by citizens for personal reasons or for pleasure.

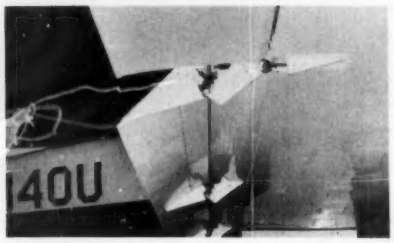
"Our airport plans call for providing satellite type airports to serve general aviation needs in our metropolitan areas. From a purely economic point of view, many United States communities have learned that decentralization of industry is placing a premium on the availability of an airport.

"Geography is no longer a problem in terms of location of industries as long as a suitable airport is available. In fact, many parts of the nation have learned that a good general aviation airport is an economic asset because it attracts industries, provides job opportunities and adds to the air accessibility of the community on the shores of the world-wide ocean of air.

"On a global basis, general aviation offers undreamed of possibilities."







Left, Fowler flap fully extended on a DC-6. Note the small airfoil section between the wing and the main flap. *Above,* split flap on a DC-3, retracted and extended. *Right,* Mooney Mark 21 provides a good example of the slotted flap. Strict attention should be paid to manufacturer's recommendations on the use of flaps.

What's the F

SAFETY FIRST

Birds have been in the flying game a lot longer than man, so it's not surprising that our feathered friends are naturally endowed with sophisticated flying equipment.

They can adjust the camber of their flight surfaces to accommodate varying conditions. But man has had to resort to flaps, slots and slats to get the same effect.

What about these high lift devices? There are five commonly used types—plain, split, slotted, Fowler and Krueger flaps.

The plain flap is a simple, hinged portion of the trailing edge. The effect on the camber added well aft of the chord causes a significant increase in lift.

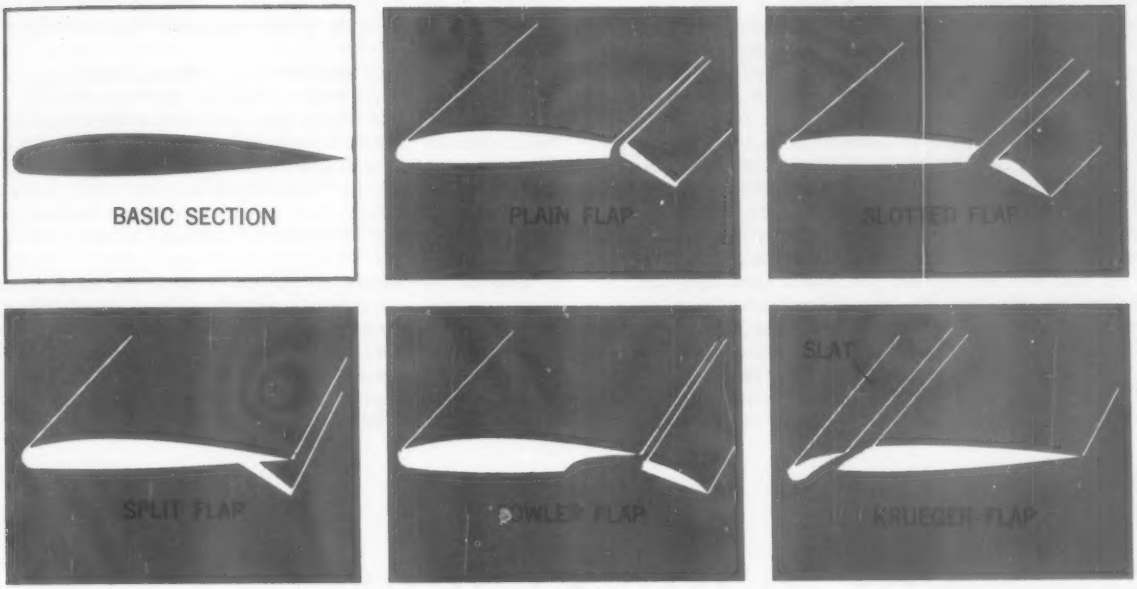
The split flap consists of a plate deflected from the lower surface of the section and produces a slightly greater change in maximum lift than the plain flap. However, a much larger change in drag results from the large turbulent wake produced by this type of flap.

The slotted flap is similar to the plain flap, but the gap between the main section and the flap leading edge is given specific contours to help in redirecting the airflow. High energy air from the main section lower surface is ducted to the flap upper surface. The slotted flap can cause much greater increases in maximum lift than the plain or split flap, and wing section drags are much lower.

The Fowler flap arrangement is similar to the slotted flap. The difference is that the deflected flap segment is moved aft along a set of tracks, which increases the chord and effects an increase in wing area. The Fowler flap is characterized by large increases in maximum lift and section drags slightly lower than the slotted flap.

Krueger flaps are high lift devices fitted to the leading edge of a wing section. Another high lift device, the fixed slot, conducts a flow of high energy air into the boundary layer on the upper surface and delays airflow separation to some higher angle of attack and lift coefficient. Since the slot alone effects no change in camber, the higher maximum lift is obtained at a higher angle of attack. That is, the slot simply delays stall to a higher angle of attack.

An automatic slot arrangement consists of a leading edge segment (slat) which is



e FLAP All About?

free to move on tracks. At low angles of attack the slat is held flush against the leading edge by the high positive local pressures. When the section is at high angles of attack, the high local suction pressures at the leading edge create a chordwise force forward to actuate the slat. The slot formed then allows the section to continue to a higher angle of attack and to produce a maximum lift greater than the basic section.

The management of high lift devices on an airplane is an important factor in flying. The devices which are actuated automatically, such as the self-operating slats and slots, are of little concern and cause few complications since relatively small changes in drag and pitching moment take place.

In order to appreciate some of the factors involved in flap management, assume that the airplane has just taken off and the flaps are extended. The pilot should not completely retract the flaps until the airplane has enough airspeed. If the flaps are retracted prematurely at insufficient speed the clean configuration may not be able to support the airplane and it may sink or stall. The same factor must be considered for intermediate flap-positions between fully retracted and fully extended. As the configuration is altered from the "dirty" to the "clean," three important changes take place:

- The reduction of camber by flap retraction changes the wing pitching moment and, for the majority of airplanes, requires retrimming to balance the nose up moment change. Some planes feature automatic retrimming programmed with flap deflection.
- The retraction of flaps causes a reduction of drag which increases the acceleration of the airplane.
- The retraction of flaps requires an increase in angle of attack to maintain the same lift. Thus, if airplane acceleration is slow through the flap retraction speed range, the angle of attack must be increased to prevent the plane from sinking. This situation is typical after takeoff when gross weight, density altitude and temperature are high.

When flaps are lowered for landing, essentially the same items must be considered:

- The increase in drag for a given value of lift requires a higher power setting to maintain airspeed and altitude.
- Lowering the flaps requires retrimming to balance the nose down moment change.
- The angle of attack required to produce the same value of lift is less. For example, flap extension tends to cause the plane to "balloon" or gain altitude.

In many aircraft, the effect of intermediate flap extension is of primary importance in certain critical operating conditions. Small initial deflections of the flaps cause noticeable increases in maximum lift without large increases in drag. This is especially true of craft equipped with slotted or Fowler flaps. Large flap deflections past 30 to 35 degrees do not create the same rate of lift change but do cause greater changes in drag. A characteristic of most airplanes is that the first 50 per cent of flap travel causes *more* than half the total change in maximum lift and the last 50 per cent of flap deflection causes *more* than half the total change in drag.

With the increase in high performance aircraft, high lift devices will become as common as retractable landing gears. And that's what the flap is all about.

Sheepskin with Wings

The next generation of professional pilots may very well come out of the halls of ivy, both sheepskin and license in hand, ready to take their places in the world of flight.

Graduates of Purdue University could be leading the way. For that university is the only place in the nation where a youngster without any flying experience can enroll as a freshman and in four years earn a B.S. degree with a major in professional pilot technology. In addition to the conventional sheepskin diploma, he'll have a commercial and instrument rating with hundreds of flight hours including copilot time in DC-3 and DC-6 aircraft. All students completing the program are given type rating rides in a DC-3. Moreover, those who meet the age and flight experience requirements are given airline transport pilot certificate check rides in the DC-3.

While the road to achieving this goal was a somewhat long and turbulent one, the final step was accomplished recently by combining the flight requirements of two existing two-year associate degree programs and adding sufficient general studies to satisfy the requirements for a B.S. degree. The basic program is "General Aviation Flight Technology," with Joseph F. Vorbeck as chairman, which in effect becomes the freshman and sophomore years. The other is Purdue's highly regarded two-year "Professional Pilot Technology," with Professor Charles F. Holleman as chairman. This program has been modified to serve as the junior and senior years of the new course of study.

Universities have not previously offered four year baccalaureate degrees in pilot technology because officials who determine policy for schools such as Purdue zealously maintain high academic standards and do not confer degrees lightly. Also, conservative forces in the education field regard flying as something "just for fun" and find it hard to relate to higher education. Specifically, they do not want to confer four year degrees on students who have not attained a certain level of academic training.

This hurdle was met at Purdue by using the standard university entrance requirements and, in addition, requiring regular university courses in the arts and sciences. As a result, students in the pilot training courses sit side by side in English, math, physics, speech and similar courses with students working for degrees in engineering, industrial management, education and the like.

Purdue's chief pilot Jerome M. Goldman, left, under the watchful eye of instructor Charles L. Lynn, Jr., right, gives a flight engineer lesson in one of Purdue's DC-6s to Robert D. Lamb, Columbia, Mo., in plaid coat, and James R. McElroy, Chicago. Lamb has 600 flight hours to his credit; McElroy, 900. Below, flight instructor Jay Stair, left, familiarizes James Tilson, 19, with a Piper Cherokee 180. Stair, who has been flying for 33 years, has a 75-year-old flying father and a 14-year-old son who intends to become a pilot.

An energetic and well-qualified staff working under the direction of Professor James R. Maris was responsible for building up the pilot training course to the point where it became acceptable for a four-year degree at Purdue. Maris, 46, is a graduate of the University of Illinois with 24 years of aviation experience. He works almost as hard selling aviation to university officials as he does guiding the Department of Aviation Technology. A whirlwind personality with a background of 11 years in the Air Force as a pilot and educational specialist, Maris is now concerned that the university can accommodate only a limited number of students in the pilot technology course.

The Purdue aviation technology staff overcame a variety of obstacles through perseverance and hard work in getting its program adopted. But the staff had one built-in advantage: Purdue has had a long aviation history. In 1931 Purdue had the first university-owned airport, and was one of the first schools in the CAA's flight training program in 1938.

This led to the establishment in 1947 of the Purdue Aeronautics Corporation (PAC) under the guidance of Grove Webster, present vice president and general manager. PAC is now certificated by the FAA as a supplemental air carrier for carrying passengers and cargo. Much of the cargo is high priority material for the nearby automotive industry. Passengers number a wide variety of groups such as college football teams, the Chicago White Sox for two seasons, military personnel and, recently, a Danish ballet company.

Purdue got into the air carrier business in the early 1950s when it purchased 12 DC-3s from two airlines and then had to sell all but three of them when the CAB refused to approve its application to operate an airline. The corporation is currently flying four DC-3s, including three completely rebuilt. PAC also owns two DC-6s and operates and maintains two others which are used to transmit educational TV programs to schools over a five-state area.

Purdue students must meet all FAA requirements to serve as DC-3 pilots. They log some 200 hours in that capacity carrying cargo and passengers for PAC. Also, students presently log flight engineer time in the DC-6, and qualify for a flight engineer's certificate if they are 21 years old.

Professor Maris expects that a number of students from each upper class will be selected to qualify as DC-6 copilots after

Professor James R. Maris

Student Larry Cook discusses a proposed cross country flight with instructor James Hennig, right, as fellow student David Greives looks on. The typical class scene below includes instructor Lynn at the blackboard and three advanced students. *Lower right*, Goldman, chief pilot, listens to student Lamb review DC-3 checklist.

Former WASP Jill S. McCormick, a major in the Air Force Reserve, instructs Dwaine C. Ratfield in an instrument flight trainer. *Below*, instructor Lynn explains the details of a cutaway model of a Pratt & Whitney engine to James O'Mahony, Lamb and Peter C. Stein, advanced students who expect to take professional pilot jobs this year.

Purdue photography, including cover photo, by Robert Peterson.

DC-6 simulator time is incorporated into the curriculum. At present, the DC-6 simulator is on loan to United Airlines in Colorado until adequate facilities are constructed at Purdue to house the unit.

The Purdue Aeronautics Corporation coordinates its activities with the school's pilot training program as well as with two other courses offered by Purdue's Department of Aviation Technology. One is its aviation maintenance technician program and the other is the aviation electronics program. Both are two-year courses which include general academic subjects as well. A high percentage of the students in these two programs elect to stay on at Purdue to obtain B.S. degrees.

The first of the general aviation graduates will move into the junior year of the B.S. program in September 1966 after they receive their two-year associate degrees. Professor Maris believes that most, if not all, of the students currently enrolled in the two-year general aviation course will likely stay on for the four-year degree. The first normal graduation will be held in June 1968, though conceivably one or more individual students, such as those in Purdue's professional pilot course, could accumulate enough credits to graduate sooner.

While the professional pilot associate degree program probably will be phased out as the new four-year program moves along, an effort is being made to preserve the present two-year general aviation course for students who desire only primary flight instruction. However, the university receives five applications for each one it can accept and it seems likely that it will select only the best qualified students—the type who would want the four-year degree.

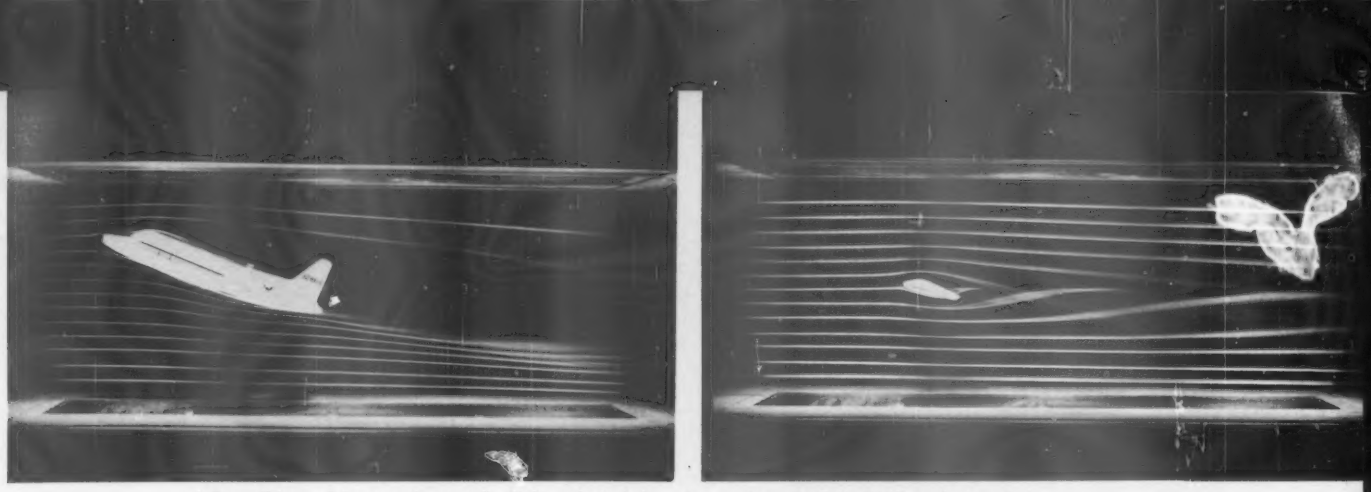
While the Department of Aviation Technology has no particular desire to restrict enrollment to graduates of Indiana high schools, out-of-state students must pay a higher tuition to enter Purdue. Moreover, out-of-state enrollment is limited to those who finish in the upper 25 per cent of their graduating class or rank in the upper 25 per cent of the scholastic aptitude portion of the college board entrance examinations.

Another cost factor is that students in the general aviation flight program must pay for flight time in Purdue's Piper *Cherokee* fleet, but flight fees are not assessed for flight time accumulated in the DC-3 or DC-6 aircraft.

Instruction in the four-year course includes training for a private pilot's license; a confidence course including lazy eights, chandelles, etc.; cross-country instruction; preparation for a commercial license and instrument rating; aircraft engines; aircraft systems and components, and airway procedures.

Later in the course, students will receive instruction in such subjects as airline operations; applied navigation; applied meteorology; regulations and flight planning; flight planning and management; airline transport regulations and radio procedures; airways procedures; DC-3 flight transition; DC-3 flight; airline transport navigation and meteorology; DC-6 aircraft and engine familiarization; DC-6 normal and emergency operations; DC-6 procedural trainer and DC-6 flight engineering.

If a student can pass courses like these, he should have no difficulty finding his place in the aviation world.



Left, small jet model approaches a stall. *Right,* wake turbulence is seen dramatically in FAA's smoke tunnel.

SEE THE WIND pass by

"Who has seen the wind? Neither you nor I. But when the trees bow down their heads, the wind is passing by."

The gal who wrote those words knew what she was talking about. There's no doubt about it—wind, or moving air, is made up of invisible gases—nitrogen (78.09 per cent), hydrogen (20.95 per cent) and argon (.93 per cent).

And that's just the trouble when it comes to classroom studies of basic aerodynamics and complex courses associated with flight test engineering. You can't see the stuff you're talking about.

Flight test engineer J. B. McCollough had the answer for the instructors at the FAA Academy in Oklahoma City—a three dimensional smoke tunnel. Defined as a wind tunnel with visible air, the smoke tunnel permits students to see the actual flow of air over various parts of model aircraft.

The smoke tunnel concept is nothing new of course (McCollough himself built his first one as an engineering student at Oklahoma University in 1955), but the one he built for the FAA Academy is regarded by some as the finest in existence.

Before starting on the tunnel, McCollough, accompanied by Paul J. Lane of the Academy's technical services branch, inspected the smoke tunnels in use at Oklahoma University, Wichita State University, Iowa University and the University of Notre Dame.

The tunnel McCollough and Lane came up with proved suitable not only for teaching the principles of aerodynamics, but for basic research as well. The tunnel features a smoke manifold with provisions for 13 smoke streams which can be adjusted so all can be used at the same time, only alternate streams are used, or just the center five streams are operational. The lines can be positioned anywhere within the test chamber by remote controls at the operator's position.

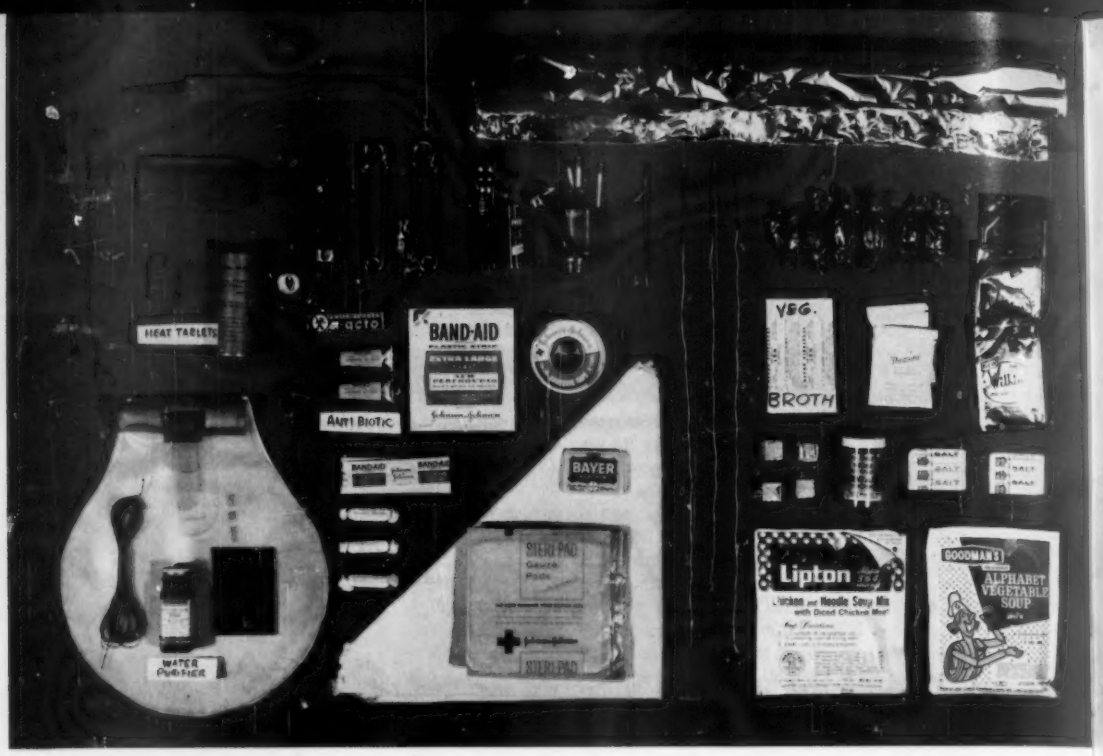
The air flow in the tunnel can reach 40 m.p.h. and is straightened out by 12 eddy screens made of fine stainless steel wires. The automated smoke generator system has controls "up front" and a sophisticated lighting system of bulbs and mirrors for proper illumination.

Thus, with proper apologies, the FAA offers this paraphrased refutation to Christina Rossetti:

"Who can see the wind? Either you or I. When the smoke swirls o'er the plane, we see the wind pass by."

But, of course, Miss Rossetti never saw the smoke tunnel.

FAA's J. B. McCollough manipulates remote control on the custom made smoke tunnel he designed. The smoke manifold is visible at the left.



After liberating supplies from your shelves at home, you can complete a survival kit for about $2. The kit may save your life.

Two-pound packet is home away from home

DOWN IS NOT OUT

Nobody we know is going to have a flying accident, especially not you, but on the outside chance something *should* happen, the difference between survival and disaster might weigh less than two pounds.

Look around your airplane and what do you see in the way of survival equipment: That can of fruit juice you bought two years ago that was going to be the start of your survival kit? Throw it away, it's probably worthless now. What else? The fishing line and hook stashed away in the envelope near the wing root? You gave that to the kid who washed the plane two years ago.

Nothing else? No pocket knife? No matches—oh, you don't smoke?

With the rapidly growing acceptance of air travel, especially in general aviation aircraft (the general aviation air fleet grew from 57,388 in 1955 to 88,742 in 1965), pilots have paid diminishing attention to personal survival in the event of a forced landing where rescue might be delayed for days.

Yet, individual survival kits can be assembled at very little cost from readily available off-the-shelf items you can pick up in any supermarket. The principal ingredient in any survival kit is action: *Put it together now*. Planned kits, to be assembled later, are useless.

Starting with the first aid items, the two-pound kit will include bandaids, a roll of half-inch adhesive tape, a pack of X-acto knife blades, a tube of antiseptic ointment for burns and lacerations, aspirin, water purification tablets, ammonia inhalers and triangle bandages.

This is a minimum of first aid supplies. Other items may be added but keep the emphasis on lightness and storability.

Now for food. Supermarket shelves are crammed with a wide variety of concentrated soup mixes, bouillon cubes (chicken and beef), dehydrated coffee and milk, sugar, salt, hard candy and vitamin capsules. Pack an assortment of each of these in a compact cube wrapped in several layers of heavy-duty aluminum foil. If needed, the foil later can be formed into cooking utensils.

Into the kit should go equipment for living off the land. Some 50 feet of high-strength fishing line and a half-dozen fish hooks are basic. A gill net is a good addition and so is a length of light wire from the aircraft for use as a snare for small game.

A scout knife, along with a pocket whetstone, is the single most important tool. You can literally carve a path to survival with it—provided you treat it as a *knife* and not a pinch bar.

Other desirable items in the kit include a waterproof match container (there are commercial ones available which include compass and a striking edge built into the case); waterproof matches; heat tablets; needles; safety pins; a file; a plastic

PEMMICAN SUPREME

Pemmican, an old Indian favorite in concentrated food and still a staple where weight and space are important considerations, might make a valuable addition to your personal survival kit. Here is the way Capt. Daniel H. Seal and S/Sgt. Dorman K. Roberts of the School of Aerospace Medicine, Brooks AFB, Texas, make their new, improved, tastier version as reported in Airman Magazine.

Take equal portions of hickory-smoked, crisp, dried beef and pecans, plus one half portion of crisp dried pitted dates. Put these through an ordinary food chopper separately and then mix together and grind the whole batch again.

Pack in bars of approximately three ounces, cover first with two layers of thin plastic sandwich wrap, then a double thickness of heavyweight aluminum foil. If the bar develops mold spots after storage, scrape them away. The mold is harmless though unappetizing in appearance.

roll-up canteen (gallon size); mirror for signaling; a button compass, and a penlight flashlight (keep batteries separate, out of flashlight).

Kits can be custom made to suit the terrain where you do most of your flying. Important considerations are storability, weight and compactness. Resist the temptation to turn what should be a very sparse kit into a portable version of a supermarket and sporting goods store.

If forced down, remain in the vicinity of the aircraft—it's bigger than you, more colorful and more likely to be seen from the air. In snowy weather try to keep the wings and horizontal stabilizer clear of snow—the reflective surfaces act as a signal mirror.

The ability to spot downed flyers is the single most difficult problem facing rescuers. And it needn't be. The countryside, in its natural state, tends to be placid and unchanged. The quickest way to attract attention is to change the appearance of the terrain around you. This is relatively easy to do—an "SOS" trampled into the snow, an "X" made with boughs, a smudge fire—all serve to disturb the face of the terrain. The variations are endless.

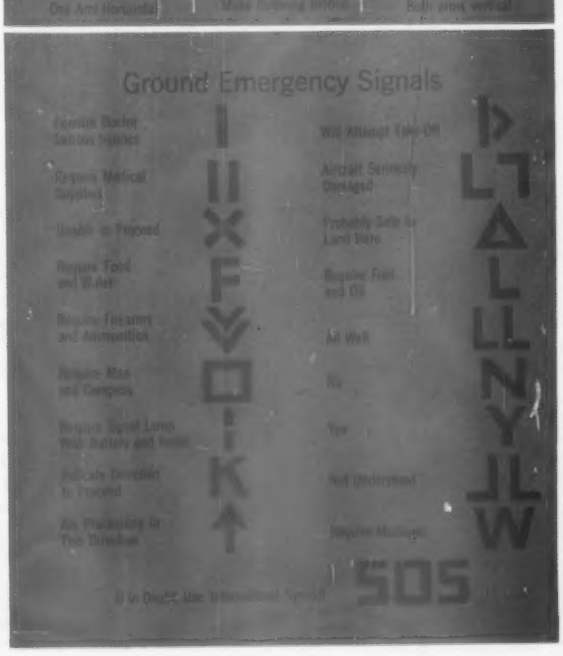
Frame of mind is a major factor of survival and this can be preconditioned by planning. If you filed a flight plan, as recommended by the FAA, you can feel confident that you will be missed and the searchers will have some idea where to look for you.

The will to survive, backed up by a little knowledge and the understanding that survival is hard work, can make the difference between life and death.

The will to live was demonstrated by a man and a woman who survived for 78 days on nothing but water. Their eventual rescue came when searchers spotted a flag they had fashioned from aircraft fabric and tied to a tree. Survival experts rate boredom as one of the most corrosive factors in the will to survive. This can be defeated by leadership—of self and others.

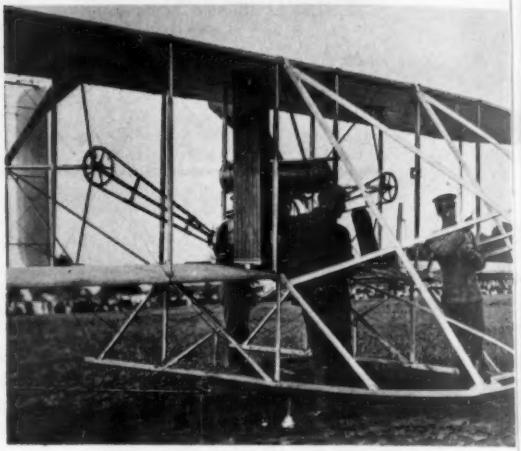
A basic ingredient is "doing things"—making your "camp" even better, even if it means doing tedious things repeatedly, and sticking to a routine where tasks have to be done on a regular, scheduled basis.

Recommended reading is Air Force Manual 64-5 "Survival," available from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, for $1.



FOULOIS, First GI Pilot

By John Leyden



More than a half century separates the photos of General Foulois, *top*, and Lieutenant Foulois, *right*. With Foulois and the Wright-built plane are Orville Wright and Wilbur Wright, almost hidden.

U. S. Air Force photos.

Officially, it was labeled the "*first* flight in the *first* Government-owned airplane by the *first* military-trained pilot," and a small monument was erected later at Fort Sam Houston in San Antonio, Texas, to commemorate the event.

Yet not even the man who made this flight takes the official description too seriously. At age 86, Maj. Gen. Benjamin D. Foulois, former chief of the Army Air Corps, remembers March 12, 1910, in more personal terms. It was the day of his "*first* take-off, *first* solo, *first* landing and *first* crack up."

The accident occurred on his fourth flight of the day when a break in the fuel line forced him to glide to a landing with a dead engine from an altitude of 40 feet. Despite the passage of almost 56 years, Foulois still remembers the details:

"I landed too high and knocked the tail completely off, but I wasn't hurt at all. Afterwards, I wrote Wilbur Wright and told him what I had done, and he wrote back and told me what I should have done."

The exchange of letters was the beginning of a lengthy correspondence between the two men on the subject of flying techniques. Foulois thus earned the distinction of being the "first correspondence course pilot" in the history of aviation.

Foulois' aviation career actually began in 1908 with an assignment to the Signal Corps Balloon Detachment at Fort Myer, Va., where the young lieutenant learned to fly the Army's only dirigible.

That same year, the Government contracted with the Wright brothers for an airplane which would carry two people, fly at 40 m.p.h., and stay aloft for at least one hour. The Wrights also were to train two Army officers to fly the machine.

On July 30, 1909, Foulois served as navigator on the final test flight of the Wright airplane at Fort Myer. Orville Wright was at the controls and averaged 42.5 m.p.h. on the cross-country speed run to win a bonus of $5,000 above the original contract price of $25,000.

The Army accepted delivery of the craft on Aug. 2.

Foulois was selected for pilot training, along with Lt. Frank P. Lahm, but was ordered to Europe as a delegate to the International Congress of Aeronautics before he could take his first lesson. Lt. Frederick E. Humphreys replaced Foulois as the second student pilot.

Returning to the United States in October, Foulois received 54 minutes of flight instruction from Wilbur Wright at College Park, Md. However, he was not permitted to take off or land the aircraft during that time. Moreover, his scheduled solo flight had to be cancelled when Lahm and Humphreys, flying together, crash landed on the College Park field on Nov. 5. Neither was injured, but the accident ended flights for the rest of the year.

While the aircraft was being repaired, the Army decided to shift flying operations to Fort Sam Houston for the winter. Foulois was ordered to accompany the aircraft, take plenty of spare parts and teach himself to fly.

After stopping off in Chicago to exhibit the aircraft at the Electrical Trade Exposition, Foulois arrived at Sam Houston during the first week in February with a small detachment of enlisted mechanics. The disassembled airplane arrived by rail a few days later. By the end of the month, it was ready to fly.

A launching platform, meanwhile, was erected on the Fort's "mounted drill ground." Since the aircraft had skids instead of wheels, it had to be catapulted into the air along a metal-shod rail by an intricate block-and-tackle arrangement.

The initial flight was scheduled for March 1, and a large crowd of soldiers and civilians was on hand for the event. Few believed that the frail-looking wood and canvas airplane would fly, and their suspicions were confirmed when the flight was cancelled at the last minute due to a faulty launching mechanism.

Still, more than 2,000 people returned the following morning to watch Foulois have another go at it. The weather was near perfect, and a carnival-like atmosphere prevailed on the parade ground. Food vendors moved among the spectators hawking their goods. Bookmakers did a brisk business.

Shortly before 9:30 a.m., Foulois climbed into the pilot's seat amid a chorus of cheers and catcalls. Then the tiny engine sputtered and caught, and the crowd fell silent.

Foulois made a last minute check of the controls and then signaled his ground crew to release the catapult. The aircraft started with a jolt, then hurried along the rail and rose gracefully into the air. The crowd roared in awe and admiration as the plane circled the drill field several times at an altitude of 100 feet and then came in for a perfect landing.

The initial flight lasted just over seven minutes and was followed by hops of 14, 21 and 20 minutes. Even the accident on the final flight did not mar the day. Foulois had proved both himself and the airplane. Both would go on to do bigger and better things.

Letters

FAA

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• 'Aviation Weather'

I would like to comment on your article about the new *Aviation Weather* book. The people involved in compiling and editing this book have far exceeded anything that was ever published by the Superintendent of Documents up to this time. It is up to date and a pleasure to read. I recommend it as a must. . . . If we could get other publications brought up to date like this one, it would be a pleasure to teach students how to fly.

T. J. Hathaway
Houston

We, too, are pleased with the public acceptance of Aviation Weather. *Six spanking new FAA publications will be released during 1966 in the areas of instrument flying, flight training and helicopter flying. A revised edition of the popular* Private Pilot's Handbook of Aeronautical Knowledge *will be published early this year.*

• Communication

(The following is an excerpt from a letter sent to FAA Administrator William F. McKee.)

On behalf of the State of Minnesota and our department, I want to thank you for the assistance given us by the Federal Aviation Agency on our recent Minnesota Flight Instructors' Seminar. . . .

The wholehearted help of FAA personnel concerned was completely in the tradition of the cooperative effort which the State of Minnesota and the FAA have enjoyed over the years. Our flight instructors' seminar was an excellent example of the best in Federal-state working relationships. . . .

Lawrence E. McCabe
Commissioner of Aeronautics
State of Minnesota

• Testing for Gas

I am a regular subscriber to *FAA Aviation News* and consider it the best in promoting safety in flying. The articles are exceptionally well written in a publication that is not lengthy and technical.

In the October issue you have a very impressive article on carbon monoxide along with the experience related by Robert J. Serling. . . . I would appreciate it if you would help me contact various manufacturers of devices to measure carbon dioxide. I have never seen one advertised.

Puyallup, Wash.

The FAA, like other Government agencies, cannot recommend or endorse products. However, there are a number of companies making colorimetric CO testers: Two Pittsburgh, Pa. firms are the Bacharach Industrial Instrument Co., 200 N. Braddock Ave., and the Mine Safety Appliances Co., 201 N. Braddock Ave. An inexpensive CO indicator called "Detector" is available from Scot Air Inc., 6451 Main St., Morton Grove, Ill. The Bendix Corp. in Cincinnati, has a similar detector called "DeadStop."

• First Air Express

I note that you are interested in "Famous Flights" so thought that you'd like to see this photograph of the first air express flight. The first commercial use of an aeroplane for the transportation of merchandise was on Nov. 7, 1910, when Phillip O. Parmalee, a Wright pilot, flew from Dayton to Columbus, Ohio. The cargo was five bolts of Rajar silk weighing 70 pounds and valued at $800. The flight covered 58.3 miles in 59 minutes, considered a record at the time. Tariff collected by the Wright Company was $71.42 per pound for a total of $4,999.40 or $85.83 per mile, probably still a record. The bolts were untied from the struts alongside the seat, loaded into a horse drawn dray and whisked to the store, where customers lined up to purchase a little swatch for $1. . . . With no return payload, and probably SW winds, the Wrights decided to ship the plane home.

James R. Hopkins
Experimental Aircraft Assoc.
Mt. Vernon, Ohio

• Charting Our Course

"Flying VFR? Use Sectional Charts" (*FAA Aviation News*, February 1965) created considerable discussion at Jeppesen & Co. as our opinions differ . . . from those expressed by the author.

The first paragraph says: ". . . To some VFR pilots the Sectional Aeronautical Chart is becoming unpopular and these pilots are risking their lives by using low altitude en route instrument charts which are designed specifically for instrument flights." We believe it would be more correct to state that low altitude en route charts (Jepco aviation charts and C&GS charts) are designed for *radio navigation* on an instrument flight plan. . . . The charts are basically designed for *radio navigation* on airways under the most severe limitations of ceiling and visibility. It is . . . a little difficult to understand how such charts can be inherently dangerous to a properly informed VFR pilot under VFR conditions. . . .

W. A. Prescott
Jeppesen & Co.
Denver

We agree our use of the general term "VFR cross country flying" could *be interpreted as meaning that the FAA has overlooked use of radio aids as the primary means of navigation in VFR weather, or that we recommend the sole use of sectional aeronautical charts for such radio navigation. But neither implication is correct.*

The FAA, in policy and practice, recognizes the use of radio navigation, based on the Coast and Geodetic radio navigation charts or Jeppesen navigation charts, for VFR, cross-country flights. We do not, however, recommend the sole use of these charts for either VFR or IFR flights.

Availability of current sectional aeronautical charts in the airplane is important for safety in case of emergency on all flights, and is essential if any part of the proposed flight may have to be made by pilotage.

• He's Right

In the December *FAA Aviation News*, transponders are described as "electronic devices installed in airplanes which automatically answer electronic questions from traffic controllers on the ground, providing the controllers with a positive identification of the aircraft on their radars."

Wouldn't a person who didn't know the meaning of the term "transponders" understand to a fair degree if it were explained as "an electronic device installed in an airplane which sends out a signal, requested by the traffic controller, in an identifiable form which is registered on the traffic controllers' radar screen?"

Reading, Pa.

Yes.

• Patience

During the past year I have ordered *Civil Aeronautics Manual-18* three separate times and I always get in return a refund and a new copy of *FAR-43*, with the statement: "*CAM-18* is replaced by *FAR-43*." How come?

APO, New York

As part of the recodification of the CARs, *the regulatory portions of Part 18 were replaced by Part 43 of the* FARs. *Much of the nonregulatory material that you may be seeking from the civil aeronautics manuals will eventually be re-issued as FAA circulars.*

The substance of CAM-18 *is being incorporated into AC 43.13-1, "Acceptable Methods, Techniques and Practices—Aircraft Inspection and Repair," and AC 43.13-2, "Acceptable Methods, Techniques and Practices—Aircraft Alterations."*

These ACs are expected to be available by March 1966.

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